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     (FILE 'HOME' ENTERED AT 16:29:25 ON 08 AUG 2003)

     FILE 'CAPLUS' ENTERED AT 16:29:40 ON 08 AUG 2003
L1          428 S (PLURAL OR PLURALITY OR MULTI-LAYER? OR MULTILAYER? OR MULTIP
L2           95 S L1 AND (FUEL CELL)
L3            6 S L2 AND (HIGH TEMPERATURE)
L4           17 S L2 AND (SOLID OXIDE)
L5           23 S L3 OR L4
L6         3926 S (FUEL CELL) AND (SOLID OXIDE)
L7            2 S L6 AND (SECOND ELECTROLYTE)
L8            2 S L7 NOT L5
L9            8 S L6 AND (SECOND (2A) ELECTROLYTE)
L10           8 S L9 NOT L5
L11           8 S L10 OR L8

=> d 1-8 ibib ti it abs

L11 ANSWER 1 OF 8  CAPLUS  COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER:         2002:331947  CAPLUS
DOCUMENT NUMBER:          136:328214
TITLE:                    Solid oxide fuel
                          cell for cogeneration system
INVENTOR(S):              Ukai, Kenji; Mizutani, Yasunobu
PATENT ASSIGNEE(S):       Toho Gas Co., Ltd., Japan
SOURCE:                   Eur. Pat. Appl., 15 pp.
                          CODEN: EPXXDW
DOCUMENT TYPE:            Patent
LANGUAGE:                 English
FAMILY ACC. NUM. COUNT:   1
PATENT INFORMATION:

     PATENT NO.        KIND  DATE          APPLICATION NO.   DATE
     ---------------   ----  --------      ---------------   --------
     EP 1202370         A1   20020502      EP 2001-125149    20011023
         R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,
            IE, SI, LT, LV, FI, RO, MK, CY, AL, TR
     JP 2002134121      A2   20020510      JP 2000-322670    20001023
     US 2002076603      A1   20020620      US 2001-982971    20011022
PRIORITY APPLN. INFO.:                   JP 2000-322670   A  20001023
TI   Solid oxide fuel cell for
     cogeneration system
IT   Power
        (generation; solid oxide fuel
        cell for cogeneration system)
IT   Fuel gas manufacturing
        (reforming, internal; solid oxide fuel
        cell for cogeneration system)
IT   Solid state fuel cells
        (solid oxide fuel cell for
        cogeneration system)
IT   1313-99-1, Nickel monoxide, uses   108916-22-9, Lanthanum manganese
     strontium oxide La0.8MnSr0.2O3   120862-57-9, Scandium yttrium zirconium
     oxide   159194-07-7, Aluminum scandium zirconium oxide   160431-95-8,
     Aluminum scandium zirconium oxide Al0.02Sc0.2Zr0.89O2.11   307002-43-3,
     Cerium scandium zirconium oxide   309934-52-9, Cerium scandium zirconium
     oxide Ce0.01Sc0.2Zr0.89O2.1   309934-53-0, Scandium yttrium zirconium
     oxide Sc0.2Y0.02Zr0.89O2.11   413584-24-4, Scandium zirconium oxide
     (Sc0.18-0.24Zr0.88-0.91O2.09-2.12)
     RL: DEV (Device component use); USES (Uses)
        (solid oxide fuel cell for
        cogeneration system)
AB   A solid oxide fuel cell is
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disclosed in which the catalytic activity of a fuel electrode is high and in which no poisoning by carbon occurs even when internal reforming is performed under a condition of a low S/C ratio and further in which the time course degrdn. of the fuel electrode is less when internal reforming is performed. In a **solid oxide fuel cell** having an oxide ion conductive solid electrolyte, and a fuel electrode and an air electrode connected to both faces thereof, a cermet of a catalyst and of the **second** solid **electrolyte** whose oxide ion cond. is more than or equal to 0.2 S/cm at 1000.degree. is used as the fuel electrode. More specifically, it is desirable that the **second** solid **electrolyte** is scandia-stabilized zirconia contg. 9 to 12 mol% of scandia.

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 2 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:315391 CAPLUS
DOCUMENT NUMBER: 136:328203

TITLE: **Solid oxide fuel cell** having a supported electrolyte film
INVENTOR(S): Ukai, Kenji; Mizutani, Yasunobu
PATENT ASSIGNEE(S): Toho Gas Co. Ltd., Japan
SOURCE: U.S. Pat. Appl. Publ., 11 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002048701	A1	20020425	US 2001-983056	20011023
JP 2002134131	A2	20020510	JP 2000-322671	20001023
EP 1202369	A1	20020502	EP 2001-125146	20011023

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

PRIORITY APPLN. INFO.: JP 2000-322671 A 20001023

TI **Solid oxide fuel cell** having a supported electrolyte film

IT **Fuel cells**
(power plants; **solid oxide fuel cell** having supported electrolyte film)

IT Automobiles
Cermets
Fuel cell electrolytes
Solid state **fuel cells**
(**solid oxide fuel cell** having supported electrolyte film)

IT 108916-22-9, Lanthanum manganese strontium oxide La0.8MnSr0.2O3 112721-99-0 113482-02-3, Tz-3y 114168-16-0, Tz-8y 157979-54-9, Scandium zirconium oxide Sc0.22Zr0.89O2.11 413584-20-0, Yttrium zirconium oxide (Y0.04-0.08Zr0.96-0.98O2.02-2.04) 413584-24-4, Scandium zirconium oxide (Sc0.18-0.24Zr0.88-0.91O2.09-2.12) 413584-27-7, Scandium zirconium oxide (Sc0.06-0.12Zr0.94-0.97O2.03-2.06)
RL: DEV (Device component use); USES (Uses)
(**solid oxide fuel cell** having supported electrolyte film)

IT 1344-28-1, Alumina, uses
RL: MOA (Modifier or additive use); USES (Uses)
(**solid oxide fuel cell** having supported electrolyte film)

AB The present invention intends to provide a **solid oxide fuel cell** having a supported electrolyte film, which

shows sufficiently high reliability, yields a high output, and exhibits high output power d. per unit vol. The present invention is characterized by use of a first cermet comprising catalyst and a **second** solid **electrolyte**, which has a bending strength of more than 500 MPa and exhibits oxide ion cond., for a fuel electrode substrate in an SOFC having a supported electrolyte film equipped with an electrolyte-electrode assembly that is made by bonding the fuel electrode substrate and an air electrode on both sides of an electrolyte film consisting of the first solid electrolyte capable of exhibiting oxide ion cond. As a preferred embodiment, stabilized zirconia contg. 2 to 4 mol% yttria or 3 to 6 mol% scandia is preferred for the **second** solid **electrolyte**.
More particularly, an interlayer comprising the second catalyst and the third solid electrolyte, which shows oxide ion cond. of more than 0.1 S/cm at 800.degree., is preferably interposed between the electrolyte film and the fuel electrode substrate.

L11 ANSWER 3 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:31172 CAPLUS
DOCUMENT NUMBER: 136:72348
TITLE: **Solid oxide fuel cell** having perovskite solid electrolytes
INVENTOR(S): Hara, Naoki; Munakata, Fumio; Iwasaki, Yasukazu
PATENT ASSIGNEE(S): Nissan Motor Co., Ltd., Japan
SOURCE: Eur. Pat. Appl., 21 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1170812	A2	20020109	EP 2001-116116	20010703
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002083611	A2	20020322	JP 2001-184558	20010619
US 2002009628	A1	20020124	US 2001-897116	20010703

PRIORITY APPLN. INFO.: JP 2000-202262 A 20000704
JP 2001-184558 A 20010619

TI **Solid oxide fuel cell** having perovskite solid electrolytes
IT Transference number
(ionic; **solid oxide fuel cell** having perovskite solid electrolytes)
IT Sputtering
(radio-frequency; **solid oxide fuel cell** having perovskite solid electrolytes)
IT **Fuel cell** electrolytes
Ionic conductivity
Perovskite-type crystals
Screen printing
Sintering
Solid state **fuel cells**
(**solid oxide fuel cell** having perovskite solid electrolytes)
IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(ZrO2 stabilized with; **solid oxide fuel cell** having perovskite solid electrolytes)
IT 12060-58-1, Samarium oxide (Sm2O3)
RL: MOA (Modifier or additive use); USES (Uses)
(ceria contg.; **solid oxide fuel cell** having perovskite solid electrolytes)

IT 1306-38-3, Ceria, uses
RL: DEV (Device component use); USES (Uses)
(samaria-added; **solid oxide fuel cell** having perovskite solid electrolytes)
IT 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 64417-98-7, Yttrium zirconium oxide 384338-66-3D, O-deficient 384338-67-4D, O-deficient
RL: DEV (Device component use); USES (Uses)
(**solid oxide fuel cell** having perovskite solid electrolytes)
IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; **solid oxide fuel cell** having perovskite solid electrolytes)
AB A **solid oxide fuel cell** (SOFC) contains a first solid electrolyte layer of LaGa-based perovskite, an air electrode, a fuel electrode and a **second** solid **electrolyte** layer (having a hole transport no. smaller than that of the first solid electrolyte layer), which is provided between the first solid electrolyte layer and an air electrode. Also, another SOFC contains a first solid electrolyte layer of LaGa-based perovskite, an air electrode, a fuel electrode and a third solid electrolyte layer (having electron and proton cond. lower than that of the first solid electrolyte layer), which is provided between the first solid electrolyte layer and the fuel electrode. Still another SOFC contains the **second** solid **electrolyte** layer provided between a first solid electrolyte layer and an air electrode and the third solid electrolyte layer provided between the first solid electrolyte layer and a fuel electrode.

L11 ANSWER 4 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:10185 CAPLUS
DOCUMENT NUMBER: 136:72293
TITLE: **Solid oxide** electrolyte **fuel cell**
INVENTOR(S): Akikusa, Jun; Tamou, Yoshitaka
PATENT ASSIGNEE(S): Mitsubishi Materials Corporation, Japan
SOURCE: Eur. Pat. Appl., 14 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1168478	A2	20020102	EP 2001-114836	20010628
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002015756	A2	20020118	JP 2000-193750	20000628

PRIORITY APPLN. INFO.: JP 2000-193750 A 20000628
TI **Solid oxide** electrolyte **fuel cell**
IT Solid state **fuel cells**
(**solid oxide** electrolyte **fuel cell**)
IT 7440-02-0, Nickel, uses 59989-70-7D, Cobalt samarium strontium oxide CoSm0.5Sr0.5O3, O-deficient 162105-72-8, Cerium samarium oxide Ce0.8Sm0.2O2 203736-04-3D, Cobalt gallium lanthanum magnesium strontium oxide Co0.08Ga0.8La0.9Mg0.12Sr0.1O3, O-deficient 220697-02-9D, Cobalt gallium lanthanum magnesium strontium oxide Co0.05Ga0.8La0.8Mg0.15Sr0.2O3, O-deficient 383423-12-9D, O-deficient
RL: DEV (Device component use); USES (Uses)
(**solid oxide** electrolyte **fuel cell**)

AB A **solid oxide fuel cell** has an improved efficiency with a solid electrolyte layer having an improved ionic cond., while maintaining the partition wall function. In order to attain this object, the present invention provides a **solid oxide fuel cell** comprising an air electrode layer, a fuel electrode layer, and a solid electrolyte layer interposed between the air electrode layer and the fuel electrode layer, wherein the solid electrolyte layer comprises a first electrolyte layer which is made of a lanthanide-gallate oxide and has a first ionic transference no. and a first total elec. cond., and a **second electrolyte** layer which is made of a lanthanide-gallate oxide and has a second ionic transference no. smaller than the first ionic transference no. and a second total elec. cond. larger than the first total elec. cond. The air electrode layer is laminated onto one side of the solid electrolyte layer; and the fuel electrode layer is laminated onto the other side of the solid electrolyte layer.

L11 ANSWER 5 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2001:819790 CAPLUS
DOCUMENT NUMBER: 136:234579
TITLE: Noble metal alloy-Zr(Sc)O2 cermet cathode for reduced-temperature SOFCs
AUTHOR(S): Sasaki, K.; Tamura, J.; Dokiya, M.
CORPORATE SOURCE: Tanaka Kikinzoku Kogyo K.K., Kanagawa, Atsugi, 243-0213, Japan
SOURCE: Solid State Ionics (2001), 144(3,4), 233-240
CODEN: SSIOD3; ISSN: 0167-2738
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English

TI Noble metal alloy-Zr(Sc)O2 cermet cathode for reduced-temperature SOFCs

IT **Fuel cell** cathodes
(noble metal alloy-Zr(Sc)O2 cermet cathode for reduced-temp. SOFCs)

IT Solid state **fuel cells**
(oxide; noble metal alloy-Zr(Sc)O2 cermet cathode for reduced-temp. SOFCs)

IT 12677-39-3 39309-13-2 54741-94-5 94949-98-1 101995-78-2 105682-73-3 156994-66-0 403647-64-3, Cerium scandium zirconium oxide (Ce0.01Sc0.1Zr0.89O2) 403647-65-4
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(noble metal alloy-Zr(Sc)O2 cermet cathode for reduced-temp. SOFCs)

AB Polarization characteristics of noble metal alloy-(Sc0.10Ce0.01)Zr0.89O2 (SSZ) cermet cathodes were studied in order to develop a new cathode for reduced-temp. **solid oxide fuel cells** (SOFCs). Several noble metal alloy-SSZ cermet cathodes were prepd. by mixing Pt, Pd, Rh and/or Ag and their alloy powders with SSZ powder by using a high-energy ball mill in vacuum and pasting the cermet onto yttria stabilized zirconia (YSZ) electrolyte. A Pt-Ag/SSZ cermet cathode achieved as high as 12 S/cm2 of interfacial cond., .sigma.E, at 973 K and 1.5 S/cm2 at 873 K in air. This Pt-Ag/SSZ cermet cathode has enough activity not only at 973 K but also at 873 K, the high activity can be obtained by selecting a suitable alloy compn., ball milling a proper ratio of SSZ/noble metal mixt. in vacuum and controlling the cathode thickness and the sintering temp. By replacing the metallic component of cermet from Pt to Pt-Ag alloy (50 wt.% Pt), the quantity of Pt in cermet can be reduced to 19 from 40 mg/cm2 in addn. to the improvement of activity from 6.7 S/cm2 at 973 K to 12 S/cm2 of .sigma.E at 973 K. The activation energies, Ea, of Pt-Ag and Pd-Ag/SSZ cermet were smaller than that of Pt/SSZ cermet. In the case of Pt-Ag/SSZ cermet, the Ea decreased with increasing Ag ratio in the Pt-Ag alloy. The Ea also depends on the SSZ/Pt-Ag ratio. This cathode showed two optima of .sigma.E vs. the SSZ/Pt-Ag ratio and a remarkable dependence on cathode thickness. The

first optimum is based on two-dimensional reaction sites on YSZ **electrolyte** and the **second** optimum originates from three-dimensional expansion of reaction sites into the cermet cathode layer.

REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 6 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2000:469743 CAPLUS
DOCUMENT NUMBER: 133:91799
TITLE: Fabrication of thin **electrolytes** for **second**-generation **solid oxide fuel cells**
AUTHOR(S): Will, J.; Mitterdorfer, A.; Kleinlogel, C.; Perednis, D.; Gauckler, L. J.
CORPORATE SOURCE: Department of Materials, ETH, Zurich, Zurich, CH-8092, Switz.
SOURCE: Solid State Ionics (2000), 131(1,2), 79-96
CODEN: SSIOD3; ISSN: 0167-2738
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
TI Fabrication of thin **electrolytes** for **second**-generation **solid oxide fuel cells**
IT **Fuel cell** electrolytes
(fabrication of thin **electrolytes** for **second**-generation **solid oxide fuel cells**)
AB This paper reviews with 120 refs. different thin-film deposition methods for oxides, esp. for stabilized zirconia and compares them with regard to **solid oxide fuel cell** applications. These methods are classified into chem. and phys. methods and ceramic powder processes. Each method is described with its special tech. features and examples of components for **fuel cells** are given. Phys. vapor deposition and chem. vapor deposition methods are specially suited for deposition of high-quality films of simple chem. compns. Liq. droplet methods and ceramic powder processes are more qualified for the deposition of complex chem. compns.
REFERENCE COUNT: 120 THERE ARE 120 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 7 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1998:92113 CAPLUS
DOCUMENT NUMBER: 128:117275
TITLE: Slip casting of thin electrolyte layers for **solid oxide fuel cells**
AUTHOR(S): Forthmann, R.; Blass, G.; Buchkremer, H. -P.
CORPORATE SOURCE: Forschungszentrum Julich GmbH, Julich, D-52425, Germany
SOURCE: Materials, Functionality & Design, Proceedings of the European Conference on Advanced Materials and Processes and Applications, 5th, Maastricht, Neth., Apr. 21-23, 1997 (1997), Volume 3, 3/271-3/274. Editor(s): Sarton, L. A. J. L.; Zeedijk, H. B. Netherlands Society for Materials Science: Zwijndrecht, Neth.
CODEN: 65PUA8
DOCUMENT TYPE: Conference
LANGUAGE: English
TI Slip casting of thin electrolyte layers for **solid oxide fuel cells**

IT **Fuel cell** electrolytes
Solid state **fuel cells**
(slip casting of thin electrolyte layers for **solid oxide fuel cells**)
IT Molding
(slip-casting; slip casting of thin electrolyte layers for **solid oxide fuel cells**)
IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(Y2O3-stabilized; slip casting of thin electrolyte layers for **solid oxide fuel cells**)
IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(ZrO2 stabilized with; slip casting of thin electrolyte layers for **solid oxide fuel cells**)
IT 7440-02-0, Nickel, uses
RL: DEV (Device component use); USES (Uses)
(anodes; slip casting of thin electrolyte layers for **solid oxide fuel cells**)
IT 201789-17-5, Yttrium zirconium oxide (Y0.85Zr0.15O1.96)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(slip casting of thin electrolyte layers for **solid oxide fuel cells**)
AB The planar **solid oxide fuel cell** (SOFC) developed at Julich is characterized by large area supporting anode substrates with rather thin electrolyte and cathode layers. This type of SOFC is designed for internal methane reforming and medium operation temps. The porous YSZ/Ni anode substrates with a thickness of 2 mm and areas up to 625 cm2 are coated with gastight but rather thin (15-20 .mu.m) electrolyte layers by using an advanced slip casting technique. Coating is done in two steps: first - closing the open surface pores of the substrate by an interlayer consisting of YSZ/NiO, and **second** - prepg. the **electrolyte** layer by using a pure YSZ suspension. The obtained electrolyte layers can be dried at room temp. without any cracking. Cofiring of the substrate-electrolyte unit is done at 1400.degree. in air. By helium leak tests of the electrolyte layer leakage values below 5.times.10-5 mbar L/s cm2 were measured. At 700 mV cell voltage max. current densities of .apprxeq.1200 mA/cm2 at 950.degree. and .apprxeq.400 mA/cm2 at 800.degree. could be reached.
REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L11 ANSWER 8 OF 8 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1996:700940 CAPLUS
DOCUMENT NUMBER: 126:34282
TITLE: Performance of double layer electrolyte cells. Part I: Model behavior
AUTHOR(S): Marques, F. M. B.; Navarro, L. M.
CORPORATE SOURCE: Ceramics and Glass Engineering Department, University of Aveiro, 3810, Aveiro, Port.
SOURCE: Solid State Ionics (1996), 90(1-4), 183-192
CODEN: SSIOD3; ISSN: 0167-2738
PUBLISHER: Elsevier
DOCUMENT TYPE: Journal
LANGUAGE: English
TI Performance of double layer electrolyte cells. Part I: Model behavior
IT **Fuel cell** electrolytes
Fuel cells
Simulation and Modeling, physicochemical
(simulation of double layer electrolyte **solid oxide fuel cells**)
IT 7782-44-7, Oxygen, miscellaneous

RL: MSC (Miscellaneous)
(permeability; simulation of double layer electrolyte **solid oxide fuel cells**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; simulation of double layer electrolyte **solid oxide fuel cells**)

AB The present work reports on the estd. performance of double layer electrolyte based **fuel cells**, including one yttria stabilized zirconia (YSZ) electron blocking layer. To evaluate the impact of the relative magnitude of the materials properties on the cell performance, a range of elec. properties has been considered, taking YSZ as ref. At const. temp., the open circuit voltage, the oxygen permeability and the oxygen partial pressure profiles in such two layer electrolyte cells are related to the materials ionic and electronic transport properties, layers thickness and overall cell oxygen partial pressure boundary conditions. The effectiveness of the electron blocking characteristics of YSZ layers is demonstrated for a variety of materials, but consideration of the exact elec. properties (the n-type but also the p-type and ionic conductivities) of the **second electrolyte** layer is shown to be a fundamental requirement for proper design of such cells.

09/897116

(FILE 'HOME' ENTERED AT 16:29:25 ON 08 AUG 2003)

FILE 'CAPLUS' ENTERED AT 16:29:40 ON 08 AUG 2003
L1 428 S (PLURAL OR PLURALITY OR MULTI-LAYER? OR MULTILAYER? OR MULTIP
L2 95 S L1 AND (FUEL CELL)
L3 6 S L2 AND (HIGH TEMPERATURE)
L4 17 S L2 AND (SOLID OXIDE)
L5 23 S L3 OR L4

=> d 1-23 ibib ti it abs

L5 ANSWER 1 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:954150 CAPLUS
DOCUMENT NUMBER: 138:387995
TITLE: LSM cathodes for SOFC prepared by plasma spraying
AUTHOR(S): Nie, Huaiwen; Huang, Wenhua; Wen, Ting-Lian; Tu, Hengyong; Zhan, Zhongliang
CORPORATE SOURCE: Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai, 200050, Peop. Rep. China
SOURCE: Journal of Materials Science Letters (2002), 21(24), 1951-1953
CODEN: JMSLD5; ISSN: 0261-8028
PUBLISHER: Kluwer Academic Publishers
DOCUMENT TYPE: Journal
LANGUAGE: English
TI LSM cathodes for SOFC prepared by plasma spraying
IT Coating process
(plasma spraying; prepn. of lanthanum manganese strontium oxide cathodes by plasma spraying for **solid oxide fuel cells**)
IT **Fuel cell** cathodes
(prepn. of lanthanum manganese strontium oxide cathodes by plasma spraying for **solid oxide fuel cells**)
IT 12031-12-8D, Lanthanum manganese oxide (LaMnO3), strontium-doped
59707-46-9, Lanthanum manganese strontium oxide
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(prepn. of lanthanum manganese strontium oxide cathodes by plasma spraying for **solid oxide fuel cells**)
AB Plasma spraying was used to prep. strontium-doped LaMnO3 perovskite (LSM) cathode layers on an yttria-stabilized zirconia electrolyte. For LSM layers prepd. by plasma spraying, there is no need to fire at elevated temp., which prevents the undesirable byproducts, i.e., SrZrO3, La2Zr2O7, from forming. After grinding and sieving, homogeneous powders with desired particle size distribution were produced and the powders between 120-200 meshes were deposited on electrolytes by plasma spraying in Ar flame with appropriate parameters. Some LSM cathode/**electrolyte multilayers** were heat treated in air at 1273 K for about 1 h for further investigation. The cathode layer shows improvement in conductivities as well as cathodic overpotential performance after heat treatment in air at 1000.degree.. On account of its simplicity and efficiency, plasma spraying appears to be a promising and plausible technique of obtaining porous LSM cathodes with good performance.
REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 2 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:552263 CAPLUS
DOCUMENT NUMBER: 137:127519

TITLE: Multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode

INVENTOR(S): Shibata, Itaru; Sugiyama, Tatsuo; Hatano, Masaharu; Yamanaka, Mitsugu; Uchiyama, Makoto; Fukuzawa, Tatsuhiro; Hara, Naoki; Kushibiki, Keiko; Satou, Fuminori

PATENT ASSIGNEE(S): Nissan Motor Co., Ltd., Japan

SOURCE: Eur. Pat. Appl., 20 pp.
CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1225648	A2	20020724	EP 2002-884	20020115
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2002289248	A2	20021004	JP 2001-144550	20010515
US 2002098404	A1	20020725	US 2002-46918	20020117

PRIORITY APPLN. INFO.: JP 2001-9394 A 20010117
JP 2001-144550 A 20010515

TI Multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode

IT Vapor deposition process
(chem., multilayer fabrication by; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT Air
(**fuel cell** electrode; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT **Fuel cell** anodes
Fuel cell cathodes
Fuel cell electrodes
Fuel cells
(multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT Vapor deposition process
(phys., multilayer fabrication by; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT 1313-99-1, Nickel oxide (NiO), uses 7440-02-0, Nickel, uses 12649-91-1
RL: DEV (Device component use); USES (Uses)
(**fuel cell** anode; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT 7439-89-6, Iron, uses 7439-91-0, Lanthanum, uses 7439-96-5, Manganese, uses 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 7440-24-6, Strontium, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-57-5, Gold, uses
RL: DEV (Device component use); USES (Uses)

(**fuel cell** cathode; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT 106390-66-3, Lanthanum manganese strontium oxide (La0.7MnSr0.3O3) 107121-70-0, Chromium lanthanum strontium oxide (CrLa0.7Sr0.3O3) 107121-72-2, Iron lanthanum strontium oxide (FeLa0.7Sr0.3O3) 443891-04-1, Cobalt lanthanum oxide (Co0.7La0.3O3)
RL: DEV (Device component use); USES (Uses)
(perovskite, **fuel cell** cathode; multilayer-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized, solid **electrolyte; multilayer** -structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(zirconia stabilized with, solid **electrolyte; multilayer**-structured **solid oxide fuel cells** contg. solid electrolyte layer, air electrode, and metal or lanthanum mixed oxide perovskite electrode)

AB A single cell for a **solid oxide fuel cell** contains a multilayered structure that includes a solid electrolyte layer, an air electrode and a fuel electrode located on the other surface of the solid electrolyte layer. The air electrode includes an adhering cathode layer formed on one surface of the solid electrolyte layer and configured to allow the air electrode and the solid electrolyte layer to adhere elec. and mech. to each other. An electricity collecting cathode layer is formed on the adhering cathode layer and is configured to collect electricity from the air electrode. The adhering cathode layer has a structure denser than the electricity collecting cathode layer, and is configured into a three-phase interface composed of a solid electrolyte layer, a reactive gas, and the electrode, or a two-phase interface composed of the solid electrode layer and the air electrode. The electricity collecting cathode layer is thicker than the adhering cathode layer, and has pores that provide access of the reactive gas to the three-phase interface or the two-phase interface. The electricity collecting cathode layer is composed of transition metals or a perovskite-type lanthanum mixed oxide.

L5 ANSWER 3 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2002:294033 CAPLUS
DOCUMENT NUMBER: 136:312604
TITLE: Method for fabrication of segmented electrode tubular **solid oxide fuel cell**
INVENTOR(S): Finnerty, Caine; Tompsett, Geoffrey; Fenton, Basil; Du, Yanhai
PATENT ASSIGNEE(S): Acumentrics Corporation, USA
SOURCE: PCT Int. Appl., 25 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

WO 2002031901 A2 20020418 WO 2001-US42721 20011012
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
AU 2002011918 A5 20020422 AU 2002-11918 20011012
PRIORITY APPLN. INFO.: US 2000-240114P P 20001012
WO 2001-US42721 W 20011012

TI Method for fabrication of segmented electrode tubular **solid oxide fuel cell**

IT **Fuel cell** anodes
Fuel cell cathodes
Fuel cell electrolytes
Solid state **fuel cells**
(method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

IT Hydrocarbons, processes
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

IT Fuel gas manufacturing
(reforming, app.; method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

IT 64417-98-7, Yttrium zirconium oxide 112721-99-0 141067-82-5, Lanthanum manganese strontium oxide lamnsro3
RL: DEV (Device component use); USES (Uses)
(method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(zirconia stabilized with; method for fabrication of segmented electrode tubular **solid oxide fuel cell**)

AB A tubular **solid oxide fuel cell** system is disclosed. The **fuel cell** system comprises, in one embodiment according to the invention: a tubular **electrolyte** layer; a **plurality** of sep. anode segments mounted on a first surface of the tubular **electrolyte** layer; and a **plurality** of sep. cathode segments mounted on a second surface of the tubular electrolyte layer, opposite the first surface, in corresponding positions to positions occupied by the sep. anode segments on the first surface; wherein corresponding anode and cathode segments form a plurality of **fuel cell** sections along the length of the tubular electrolyte layer. Related methods of manufg. and operating tubular **solid oxide fuel cell** systems, and of reforming hydrocarbon fuels, are also disclosed.

L5 ANSWER 4 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2002:158165 CAPLUS
DOCUMENT NUMBER: 136:203083
TITLE: **Multilayered** multifunctional

electrolyte in integrated **solid oxide fuel cells**

INVENTOR(S): Doshi, Rajiv; Lear, Gregory; Chung, Brandon; Ong, Estela; Montgomery, Kurt; Minh, Nguyen; Guan, Jie

PATENT ASSIGNEE(S): Honeywell International Inc., USA

SOURCE: PCT Int. Appl., 25 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002017420	A2	20020228	WO 2001-US25271	20010810
WO 2002017420	A3	20030213		

W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 6558831	B1	20030506	US 2000-642750	20000818
AU 2001084851	A5	20020304	AU 2001-84851	20010810
EP 1327279	A2	20030716	EP 2001-963937	20010810

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

PRIORITY APPLN. INFO.:

US 2000-642750	A	20000818
WO 2001-US25271	W	20010810

TI **Multilayered** multifunctional **electrolyte** in integrated **solid oxide fuel cells**

IT **Fuel cell electrolytes**
Solid state **fuel cells**
(**multilayered** multifunctional **electrolyte** in integrated **solid oxide fuel cells**)

IT 60800-19-3, Aluminum zirconium oxide
RL: DEV (Device component use); USES (Uses)
(**multilayered** multifunctional **electrolyte** in integrated **solid oxide fuel cells**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(partially stabilized; **multilayered** multifunctional **electrolyte** in integrated **solid oxide fuel cells**)

AB A **solid oxide fuel cell** comprises an anode, a cathode opposite to the anode, and an electrolyte between the anode and cathode. The electrolyte includes a barrier layer proximate to the anode, with the barrier layer preventing chem. interactions between the electrolyte and anode in addn. to preventing elemental losses from the electrolyte. The electrolyte further includes a strengthening layer proximate to the cathode, with the strengthening layer having alternating layer elements that provide fracture resistance to the electrolyte.

L5 ANSWER 5 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2001:880902 CAPLUS

DOCUMENT NUMBER: 136:104980

TITLE: Reduction in the operating temperature of

solid oxide fuel cells - potential use in transport applications

AUTHOR(S): Cassir, Michel; Gourba, Emmanuel

CORPORATE SOURCE: Laboratoire d'Electrochimie et de Chimie analytique (UMR 7575), Ecole Nationale Superieure de Chimie de Paris, Paris, 75231, Fr.

SOURCE: Annales de Chimie (Paris, France) (2001), 26(4), 49-58
CODEN: ANCPAC; ISSN: 0151-9107

PUBLISHER: Editions Scientifiques et Medicales Elsevier

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

TI Reduction in the operating temperature of **solid oxide fuel cells** - potential use in transport applications

IT Solid state **fuel cells**
(development of **solid oxide fuel cells** operating at reduced temp. for potential use in transport applications)

AB A review. The development of **solid oxide fuel cells** offers new perspectives, in particular as auxiliary power units for vehicle applications. The elaboration of thin electrolyte layers is the main challenge in order to reduce their operating temp. A brief summary of the deposition techniques and of the potential electrolytes is presented. A relatively new technique, at. layer deposition, allows to produce thin, dense and homogeneous layers, i.e., zirconia or zirconia-based thin layers can be deposited on different substrates. The interest of elaborating bi- or **multi-layer electrolytes** is outlined.

REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 6 OF 23 CAPLUS

ACCESSION NUMBER: 2001:576058 CAPLUS

DOCUMENT NUMBER: 135:139867

TITLE: Method of fabricating **solid oxide fuel cell** electrodes

INVENTOR(S): Minh, Nguyen Q.

PATENT ASSIGNEE(S): Alliedsignal Inc., USA

SOURCE: U.S., 6 pp.
CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6270536	B1	20010807	US 1999-256485	19990223
US 2001051295	A1	20011213	US 2001-900589	20010706

PRIORITY APPLN. INFO.: US 1998-84840P P 19980508
US 1999-256485 A3 19990223

TI Method of fabricating **solid oxide fuel cell** electrodes

IT Electric contacts
Fuel cell anodes
Fuel cell electrodes
Solid state **fuel cells**
(method of fabricating **solid oxide fuel cell** electrodes)

IT Composites
(microcomposites; method of fabricating **solid oxide fuel cell** electrodes)

IT Materials
(tapes, elec. conductive; method of fabricating **solid oxide fuel cell** electrodes)

AB A method of fabricating **solid oxide fuel cell** electrodes, and in particular anodes, includes the steps of forming a microcomposite element comprising a plurality of layers of an elec. conductive tape and an **electrolyte** tape, with the **plurality** of layers forming a first elec. conductive pattern. A plurality of microcomposite subelements are created from the microcomposite element, with each microcomposite subelement having the first elec. conductive pattern. A plurality of the microcomposite subelements are juxtaposed to one another and also rotated in planes substantially parallel to one another. Thereby, a totality of the first elec. conductive patterns form a second elec. conductive pattern in the anode. Elec. conduction is established with the patterns all being in elec. contact with one another.

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 7 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2001:296208 CAPLUS
DOCUMENT NUMBER: 135:79359
TITLE: The influence of electrodes on the strength of planar zirconia **solid oxide fuel cells**
AUTHOR(S): Selcuk, A.; Merere, G.; Atkinson, A.
CORPORATE SOURCE: Department of Materials, Imperial College, London, SW7 2BP, UK
SOURCE: Journal of Materials Science (2001), 36(5), 1173-1182
CODEN: JMTSAS; ISSN: 0022-2461
PUBLISHER: Kluwer Academic Publishers
DOCUMENT TYPE: Journal
LANGUAGE: English

TI The influence of electrodes on the strength of planar zirconia **solid oxide fuel cells**

IT Distribution function
(Weibull; influence of electrodes on strength of planar zirconia **solid oxide fuel cells**)

IT Bending strength
Fuel cell electrodes
Fuel cell electrolytes
Solid state **fuel cells**
Strength
Thermal expansion
(influence of electrodes on strength of planar zirconia **solid oxide fuel cells**)

IT 157975-54-7D, Lanthanum manganese strontium oxide La0.75MnSr0.2O3, O-deficient
RL: DEV (Device component use); USES (Uses)
(influence of electrodes on strength of planar zirconia **solid oxide fuel cells**)

IT 1313-99-1, Nickel monoxide, uses 112721-99-0 114922-24-6, Yttrium zirconium oxide Y0.16Zr0.84O1.92
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(influence of electrodes on strength of planar zirconia **solid oxide fuel cells**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(yttria-stabilized; influence of electrodes on strength of planar zirconia **solid oxide fuel cells**
)

IT 1314-36-9, Yttria, uses

RL: DEV (Device component use); PRP (Properties); USES (Uses)
(zirconia stabilized with; influence of electrodes on strength of planar zirconia **solid oxide fuel cells**)

AB The strength of sym. anode/electrolyte/anode and cathode/**electrolyte**/cathode planar **multiple** electrode assemblies (MEAs), fabricated by screen printing electrodes onto pre-fired tape-cast electrolyte plates was measured in biaxial flexure. The electrolyte was Zr0.84Y0.16O1.92 (YSZ), the anode NiO/YSZ and the cathode La0.75Sr0.2MnO3-.delta.. The residual stress in the electrodes was estd. by curvature measurement after removal of one electrode. The residual stress in the anodes was very low (11 MPa) due to stress relief by extensive channel cracking. The residual stress in the cathodes was much higher (39 MPa) and was in reasonable agreement with the expected thermoelastic stress. The applied load at failure, and the stress in the electrolyte at failure (343 MPa), for anode MEAs were almost equal to those of electrolyte plates (374 MPa). This is consistent with the low residual stress and obsd. crack deflection by delamination at the anode/electrolyte interface. The applied load at failure, and the stress in the electrolyte at failure (182 MPa), for cathode MEAs were much lower. This is partially explained by the residual stress in the cathode acting to increase the applied stress intensity at defects in the electrolyte, but this effect is not large enough to explain fully the reduced strength.

REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 8 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 2000:358448 CAPLUS
DOCUMENT NUMBER: 132:350208
TITLE: Application of electrophoretic deposition technique to **solid oxide fuel cells**
AUTHOR(S): Negishi, Hideyuki; Sakai, Natsuko; Yamaji, Katsuhiko; Horita, Teruhisa; Yokokawa, Harumi
CORPORATE SOURCE: National Institute of Materials and Chemical Research, Tsukuba, 305-8565, Japan
SOURCE: Journal of the Electrochemical Society (2000), 147(5), 1682-1687
CODEN: JESOAN; ISSN: 0013-4651
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

TI Application of electrophoretic deposition technique to **solid oxide fuel cells**

IT Electrophoretic deposition
Solid state **fuel cells**
(application of electrophoretic deposition technique to **solid oxide fuel cells**)

IT 7440-02-0P, Nickel, uses 112721-99-0P 114168-16-0P, Tz-8y 151258-37-6DP, Lanthanum manganese oxide La0.96MnO3, O-excess or O-deficient 161563-15-1DP, Lanthanum manganese strontium oxide La0.63MnSr0.27O3, O-excess or O-deficient 163232-57-3DP, Lanthanum manganese oxide La0.92MnO3, O-excess or O-deficient 269056-06-6DP, Lanthanum manganese strontium oxide (La0.81MnSr0.14O3), O-excess or O-deficient
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(application of electrophoretic deposition technique to **solid oxide fuel cells**)

IT 1314-23-4P, Zirconia, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(yttria-stabilized; application of electrophoretic deposition technique to **solid oxide fuel cells**)

IT 1314-36-9P, Yttria, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(zirconia stabilized with; application of electrophoretic deposition technique to **solid oxide fuel cells**)

AB The technol. feasibility of applying electrophoretic deposition to **solid oxide fuel cells** was investigated by making small tubular cathode substrates and cathode/**electrolyte**/anode **multilayers**. A small tube made of LaxMnO3.+-.d (LM), (La0.7Sr0.3)0.9MnO3.+-.d, or (La0.85Sr0.15)0.95MnO3.+-.d was obtained by depositing lanthanum manganite on graphite substrate from an iodine added acetone bath or an isopropanol bath. The graphite was oxidized and removed during sintering, resulting in a tubular LM with one end closed. A multilayer consisting of porous LM/dense YSZ/porous NiO-YSZ was obtained by deposition of yttria-stabilized zirconia on presintered LM and subsequent codeposition of NiCO3 powder and YSZ powder on the YSZ-deposited LM. Finally, this LM (presintered)/YSZ (as-deposited)/NiCO3-YSZ (as-deposited) layer was cofired.

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 9 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1999:533435 CAPLUS
DOCUMENT NUMBER: 131:202173
TITLE: Fabrication of small tubular SOFCs by electrophoretic deposition technique
AUTHOR(S): Negishi, Hideyuki; Sakai, Natsuko; Yamaji, Katsuhiko; Horita, Teruhisa; Yokokawa, Harumi
CORPORATE SOURCE: National Institute of Materials and Chemical Research, Tsukuba, 305-8565, Japan
SOURCE: Proceedings - Electrochemical Society (1999), 99-19(Solid Oxide Fuel Cells (SOFC VI)), 885-892
CODEN: PESODO; ISSN: 0161-6374
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

TI Fabrication of small tubular SOFCs by electrophoretic deposition technique

IT Electrophoretic deposition
Fuel cell electrolytes
Solid state **fuel cells**
(fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)

IT **Fuel cell** cathodes
(lanthanum strontium manganese oxide; fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)

IT 1313-99-1, Nickel oxide, uses
RL: DEV (Device component use); USES (Uses)
(ed with; fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)

IT 114168-16-0, Yttrium zirconium oxide (Y0.16Zr0.92O2.08) 133878-25-8, Lanthanum manganese strontium oxide (La0.78MnSr0.2O3)
RL: DEV (Device component use); USES (Uses)
(fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)

IT 67-64-1, Acetone, uses
RL: NUU (Other use, unclassified); USES (Uses)
(solvent; fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)

IT 1314-23-4, Zirconium oxide, uses
RL: DEV (Device component use); USES (Uses)
(yttria-doped, electrolyte; fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)
IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(zirconia doped with; fabrication of small tubular **solid oxide fuel cells** by electrophoretic deposition technique)
AB The technol. feasibility of applying electrophoretic deposition technique to **solid oxide fuel cells** has been investigated by making a small tubular cathode substrate and a cathode/**electrolyte**/anode **multilayers**. A small tube made of La0.92MnO3(LM), or (La0.85Sr0.15)0.95MnO3(LSM) was obtained by depositing lanthanum manganite powder on graphite substrate in an iodine added acetone bath or a 2-propanol bath. Graphite was oxidized and removed during a sintering process, resulting in a tubular LM(LSM) with one end closed. A multilayer consisting of porous LM/dense YSZ/porous NiO-YSZ was obtained by deposition of YSZ on pre-sintered LM and subsequent co-deposition of NiCO3 and YSZ. Finally, this LM(pre-sintered)/YSZ(as deposited)/NiCO3-YSZ(as deposited) layer was co-fired.
REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 10 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1998:712840 CAPLUS
DOCUMENT NUMBER: 129:318681
TITLE: Cells using metal fiber-reinforced ceramics for power generation in **solid oxide fuel cells**
INVENTOR(S): Yano, Atsushi; Shiraki, Takashi; Tomono, Hiroshi
PATENT ASSIGNEE(S): Hitachi Shipbuilding and Engineering Co., Ltd., Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10294114	A2	19981104	JP 1997-99523	19970417

PRIORITY APPLN. INFO.: JP 1997-99523 19970417
TI Cells using metal fiber-reinforced ceramics for power generation in **solid oxide fuel cells**
IT Ceramics
(fiber-reinforced; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**)
IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(iridium; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**)
IT Electric conductors, ceramic
Fuel cell electrolytes
(metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**)
IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES

(Uses)
(molybdenum; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(niobium; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(osmium; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(rhenium; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(ruthenium; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(tantalum; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT Metallic fibers
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(tungsten; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT 114168-16-0, Yttrium zirconium oxide (Y0.16Zr0.92O2.08)
RL: DEV (Device component use); USES (Uses)
(ceramics; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT 7439-88-5, Iridium, uses 7439-98-7, Molybdenum, uses 7440-03-1, Niobium, uses 7440-04-2, Osmium, uses 7440-15-5, Rhenium, uses 7440-18-8, Ruthenium, uses 7440-25-7, Tantalum, uses 7440-33-7, Tungsten, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(fibers; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(yttria-stabilized; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel cells**
)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(zirconia ceramics contg.; metal fiber-reinforced conductive ceramic cells for multilayer **solid oxide fuel**

cells)
AB The cells use conductive ceramics formed by adding 5-20 vol.% metal fibers having diam. 0.02-0.1 mm to ZrO2 powders contg. 8 mol% Y2O3. Even though the cells are stacked to form **multilayers** (10 layers), the **electrolytes** of the ceramics do not crack.

L5 ANSWER 11 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1998:97518 CAPLUS
DOCUMENT NUMBER: 128:130235
TITLE: Plasma spraying of **solid oxide fuel cell** components
AUTHOR(S): Schiller, G.; Muller, M.; Ruckdaschel, R.; Henne, R.; Lang, M.
CORPORATE SOURCE: Deutsche Forschungsanstalt Fur Luft-Und Raumfahrt, Stuttgart, Germany
SOURCE: Thermal Spray: A United Forum for Scientific and Technological Advances, Proceedings of the United Thermal Spray Conference, 1st, Indianapolis, Sept. 15-18, 1997 (1998), Meeting Date 1997, 27-34. Editor(s): Berndt, Christopher C. ASM International: Materials Park, Ohio.
CODEN: 65QNAQ
DOCUMENT TYPE: Conference
LANGUAGE: English
TI Plasma spraying of **solid oxide fuel cell** components
IT Solid state **fuel cells**
(plasma spraying of **solid oxide fuel cell** components)
IT Coating process
(plasma spraying; plasma spraying of **solid oxide fuel cell** components)
IT 1314-23-4P, Zirconia, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(Y2O3-stabilized, electrolyte; plasma spraying of **solid oxide fuel cell** components)
IT 1314-36-9P, Yttria, uses
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(ZrO2 stabilized with, electrolyte; plasma spraying of **solid oxide fuel cell** components)
IT 7440-02-0P, Nickel, uses 12635-27-7P
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(anodes; plasma spraying of **solid oxide fuel cell** components)
IT 108916-22-9P, Lanthanum manganese strontium oxide La0.8MnSr0.2O3
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(cathode; plasma spraying of **solid oxide fuel cell** components)
IT 64417-98-7P, Yttrium zirconium oxide 144495-63-6P, Yttrium zirconium oxide Y0.13Zr0.93O2.07
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(electrolyte; plasma spraying of **solid oxide fuel cell** components)
IT 110584-65-1P, Calcium chromium lanthanum oxide Ca0.1CrLa0.9O3
110584-69-5P, Chromium lanthanum strontium oxide CrLa0.9Sr0.1O3
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(protective layer; plasma spraying of **solid oxide fuel cell** components)

AB The central components for **solid oxide fuel cells** (SOFC) are the electrodes-**electrolyte multilayer** arrangement (PEN) and the sepg. bipolar plates. The PEN (pos. electrode-electrolyte-neg. electrode) assembly consists of a dense gastight yttria-stabilized zirconia (YSZ) electrolyte and porous electrodes for which usually Ni-YSZ cermet anode and Sr-doped LaMnO3 cathode layers are used. The various PEN units are connected in a cell stack by bipolar plates which are either metallic or ceramic ones. Furthermore, a protective layer on the metallic bipolar plates consisting of a chromium alloy is required to prevent chromium evapn. leading to a rapid and strong degrdn. of the SOFC performance. At the DLR Stuttgart both the DC and the RF vacuum plasma spraying technique have been further developed and adapted to meet the requirements for the manuf. of the different SOFC components. The DC-VPS process using specially developed Laval-like nozzles is esp. appropriate to the prodn. of thin and dense coatings as required for the electrolyte and the protective layers. However, applying special spray parameters and nozzles it is also possible to deposit porous electrode layers. The prodn. of the entire PEN arrangement in one consecutive DC-VPS process is the objective of the actual development. On the other hand, the RF plasma spray technique is suitable for the near net-shape prodn. of bulk components such as the metallic bipolar plate. The development of the deposition processes for the prodn. of SOFC components using DC and RF plasma spray methods and the results obtained concerning PEN fabrication, deposition of protective layers and the near net-shape prodn. of metallic bipolar plates are presented in the paper.

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 12 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1998:52360 CAPLUS

DOCUMENT NUMBER: 128:104302

TITLE: Comparison of power densities and chemical potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes

AUTHOR(S): Soral, Prashant; Pal, Uday; Worrell, Wayne L.

CORPORATE SOURCE: Dep. Mater. Sci. Eng., Massachusetts Inst. Technol., Cambridge, MA, 02139, USA

SOURCE: Journal of the Electrochemical Society (1998), 145(1), 99-106
CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

TI Comparison of power densities and chemical potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes

IT **Fuel cell** electrolytes
Solid state **fuel cells**
(comparison of power densities and chem. potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes)

IT 12036-41-8, Terbia
RL: DEV (Device component use); USES (Uses)
(Y2O3-stabilized ZrO2 contg.; comparison of power densities and chem. potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)

(Y2O3-stabilized; comparison of power densities and chem. potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(ZrO2 stabilized with; comparison of power densities and chem. potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes)

IT 67338-79-8, Cerium yttrium oxide (Ce19Y2O41) 114168-16-0, Yttrium zirconium oxide Y0.16Zr0.92O2.08 152233-89-1, Cerium gadolinium oxide Ce0.9Gd0.1O1.95
RL: DEV (Device component use); USES (Uses)
(comparison of power densities and chem. potential variation in **solid oxide fuel cells** with multilayer and single-layer oxide electrolytes)

AB Several multilayer and single-layer mixed conducting oxide structures are compared for their use as electrolytes in **solid oxide fuel cells**. Detailed calcns. of the power d. characteristics and the variation of the oxygen chem. potential gradient as a function of the external load and thickness of the oxide layers are provided. Engineering implications of the anal. in terms of designing efficient as well as mech. and chem. stable **fuel cells** with a layered electrolyte structure are also provided.

REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 13 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1995:710631 CAPLUS
DOCUMENT NUMBER: 123:88313
TITLE: Development of cofired type planar SOFC
AUTHOR(S): Takagi, Hiroshi; Taira, Hiroaki; Kobayashi, Shozo; Sakamoto, Sadaaki; Tomono, Kunisaburo
CORPORATE SOURCE: R and D Div., Murata Manufacturing Co., Ltd., Kyoto, 617, Japan
SOURCE: Proceedings - Electrochemical Society (1995), 95-1(Solid Oxide Fuel Cells (SOFC-IV)), 120-8
CODEN: PESODO; ISSN: 0161-6374
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

TI Development of cofired type planar SOFC

IT **Fuel cells**
(development of cofired type planar **solid oxide fuel cell**)

IT 112721-99-0
RL: DEV (Device component use); USES (Uses)
(anodes; development of cofired type planar **solid oxide fuel cell**)

IT 126447-16-3, Lanthanum manganese strontium oxide La0-1MnSr0-1O3
RL: DEV (Device component use); USES (Uses)
(cathodes; development of cofired type planar **solid oxide fuel cell**)

IT 64417-98-7, Yttrium zirconium oxide
RL: DEV (Device component use); USES (Uses)
(electrolyte; development of cofired type planar **solid oxide fuel cell**)

IT 11105-45-6 12017-94-6, Chromium lanthanum oxide CrLaO3
RL: DEV (Device component use); USES (Uses)
(interconnect; development of cofired type planar **solid oxide fuel cell**)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)

(yttria-stabilized, electrolyte; development of cofired type planar **solid oxide fuel cell**)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(zirconia stabilized with, electrolyte; development of cofired type planar **solid oxide fuel cell**)

AB The multiple **solid oxide fuel cell** (SOFC) stacks were fabricated with cofired anode/**electrolyte**/cathode **multilayers** and Ni-Cr alloy interconnects. The four multilayers connected in a same cell plane are sandwiched by the interconnects. The effective electrode area in each cell plane was 484 cm2. The max. power of 5 .times. 4 multiple cell stack (5 series, 4 parallel) was 601 W (0.25 W/cm2, fuel utilization = 40%). In order to improve the durability of cofired multilayers, the modification of cofiring temp., compn. and synthesis process proved to be effective. A roughening of anode/electrolyte interface contributed to decrease the anodic polarization.

L5 ANSWER 14 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1995:330855 CAPLUS
DOCUMENT NUMBER: 122:85437
TITLE: Solid electrolyte electrochemical cells
INVENTOR(S): Sakata, Fumitoshi; Inoe, Yoshiaki
PATENT ASSIGNEE(S): Mitsubishi Heavy Ind Ltd, Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 06260182	A2	19940916	JP 1993-42760	19930303

PRIORITY APPLN. INFO.: JP 1993-42760 19930303

TI Solid electrolyte electrochemical cells

IT Electrolytic cells
(solid **electrolyte** electrolytic cells with **multilayer** electrodes for **high temp**. electrolysis of water)

IT **Fuel cells**
(solid-state, solid **electrolyte fuel cells** with **multilayer** electrodes for improved adhesion between electrodes and electrolyte)

IT 64417-98-7, Yttrium zirconium oxide
RL: DEV (Device component use); USES (Uses)
(solid **electrolyte** electrochem. cells with **multilayer** electrodes for improved adhesion between electrodes and electrolyte)

IT 12016-86-3, Cobalt lanthanum oxide (CoLaO3) 113514-55-9, Calcium lanthanum manganese oxide (calaMnO3)
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(solid **electrolyte** electrochem. cells with **multilayer** electrodes for improved adhesion between electrodes and electrolyte)

IT 7732-18-5, Water, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(solid **electrolyte** electrolytic cells with **multilayer** electrodes for **high temp**. electrolysis of water)

AB The cells are prepd. by successively applying a Mn based multi oxide slurry, a Co based multi oxide slurry, and a Mn based multi oxide slurry on the outside surface of a solid electrolyte tube and firing. The cells have strong adhesion of the oxide layers on the electrolyte tube and can be used for **high temp**. steam electrolysis or as solid

electrolyte **fuel cells**.

L5 ANSWER 15 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1994:659747 CAPLUS
DOCUMENT NUMBER: 121:259747
TITLE: **Solid oxide fuel-cell** construction or stack
INVENTOR(S): Field, Clive Richard
PATENT ASSIGNEE(S): British Nuclear Fuels PLC, UK
SOURCE: PCT Int. Appl., 43 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9422177	A1	19940929	WO 1994-GB479	19940311
W: AU, CA, JP, US				
RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
AU 9462119	A1	19941011	AU 1994-62119	19940311

PRIORITY APPLN. INFO.: GB 1993-5189 19930313
WO 1994-GB479 19940311

TI **Solid oxide fuel-cell** construction or stack

IT **Fuel cells**
(stacks of **solid-oxide**)

AB The stack comprises an array of **fuel cells** each including an anode, a cathode and an **electrolyte**, a **plurality** of interconnect portions elec. connecting the anode and the cathode of adjacent cells, the **fuel cells** and the interconnect portions being formed in a unitary structure comprising a multiplicity of channels along which fuel and oxidant may be delivered in use. The mutual configuration of the anodes, cathodes and interconnect portions is such that the **fuel cells** are elec. connected in a series chain across the cell construction transversely to the channels whereby in use an electrochem. voltage is developed across the series chain and wherein the interconnect portions are formed in structures which each comprise a closed or partly closed shape around .gtoreq.40% of the cross-sectional area of each such channel in the region where the interconnect material is provided.

L5 ANSWER 16 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1994:609262 CAPLUS
DOCUMENT NUMBER: 121:209262
TITLE: **Multilayer** ceramic **electrolyte** foil for planar **high-temperature fuel cell**
INVENTOR(S): Wersing, Wolfram; Ivers-Tiffee, Ellen
PATENT ASSIGNEE(S): Siemens A.-G., Germany
SOURCE: Ger. Offen., 5 pp.
CODEN: GWXXBX
DOCUMENT TYPE: Patent
LANGUAGE: German
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DE 4307727	A1	19940915	DE 1993-4307727	19930311
DE 4307727	C2	19950105		

DE 4307727 C3 20001026
PRIORITY APPLN. INFO.: DE 1993-4307727 19930311
TI **Multilayer** ceramic **electrolyte** foil for planar **high-temperature fuel cell**
IT **Fuel-cell electrolytes**
(**multilayer** ceramic foil for planar **high-temp.**)
IT 55575-02-5P, Cerium gadolinium oxide 64417-98-7P, Yttrium zirconium oxide
RL: DEV (Device component use); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
(**multilayer** ceramic **electrolyte** foil for planar **high-temp. fuel cell**)
AB The foil comprises a mech. stable (40-100)-.mu.m ceramic (Gd-modified CeO2) layer having a higher ionic cond. than a Y-stabilized ZrO2 and a .ltoreq.15-.mu.m Y-stabilized ZrO2 layer, or only a mech. stable layer of a tetragonal partly stabilized ZrO2.

L5 ANSWER 17 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1993:499873 CAPLUS
DOCUMENT NUMBER: 119:99873
TITLE: Solid-electrolyte **fuel cells** with low-resistance electrolytes
INVENTOR(S): Taniguchi, Shunsuke; Ishida, Noboru; Akyama, Yukinori; Murakami, Shuzo; Saito, Toshihiko
PATENT ASSIGNEE(S): Sanyo Electric Co, Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 05062700	A2	19930312	JP 1991-222790	19910903

PRIORITY APPLN. INFO.: JP 1991-222790 19910903
TI Solid-electrolyte **fuel cells** with low-resistance electrolytes
IT **Fuel-cell electrolytes**
(yttria-stabilized zirconia, **multilayer** low-resistance)
IT 113482-02-3, Yttrium zirconium oxide (Y0.06Zr0.97O2.03) 114168-16-0, Yttrium zirconium oxide (Y0.16Zr0.92O2.08)
RL: USES (Uses)
(electrolytes contg. layers of, for **fuel cells**)
IT 1314-23-4, Zirconia, uses
RL: USES (Uses)
(yttria-stabilized, **multilayer electrolytes** of, for **fuel cells**)
IT 1314-36-9, Yttria, uses
RL: USES (Uses)
(zirconia stabilized with, **multilayer electrolytes** of, for **fuel cells**)
AB The **fuel cells** have a **multilayer electrolyte** held between a cathode-anode pair, where the electrolyte is composed of ion-conductive oxide solid solns. having different compns. between layers.

L5 ANSWER 18 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1993:499829 CAPLUS
DOCUMENT NUMBER: 119:99829
TITLE: Sputter-deposited medium-temperature **solid**

oxide fuel cells with
multi-layer electrolytes

AUTHOR(S): Wang, L. S.; Barnett, S. A.

CORPORATE SOURCE: Department of Materials Science and Engineering, Northwestern University, Evanston, IL, 60208, USA

SOURCE: Solid State Ionics (1993), 61(4), 273-6
CODEN: SSIOD3; ISSN: 0167-2738

DOCUMENT TYPE: Journal

LANGUAGE: English

TI Sputter-deposited medium-temperature **solid oxide fuel cells** with **multi-layer electrolytes**

IT Sputtering
(of medium-temp. **solid oxide fuel cells** with **multi-layer electrolytes**)

IT **Fuel-cell** electrolytes
(yttria-stabilized zirconia, sputter deposited thin-film multilayer, performance of)

IT 112721-99-0
RL: USES (Uses)
(anodes, sputter-deposited medium-temp. **solid oxide fuel cells** with **multi-layer electrolytes** and)

IT 127637-84-7
RL: USES (Uses)
(cathodes, sputter-deposited medium-temp. **solid oxide fuel cells** with **multi-layer electrolytes** and)

IT 106830-29-9, Yttrium zirconium oxide (Y0.2Zr0.9O2.1)
RL: USES (Uses)
(**electrolyte, multi-layer,** sputter-deposited medium-temp. **solid oxide fuel cells** with)

IT 1304-76-3, Bismuth oxide (Bi2O3), uses 1306-38-3, Cerium dioxide, uses 1314-23-4, Zirconia, uses
RL: USES (Uses)
(yttria-stabilized, **electrolyte, multi-layer,** sputter-deposited medium-temp. **solid oxide fuel cells** with)

IT 1314-36-9, Yttria, uses
RL: USES (Uses)
(zirconia stabilized with, **electrolyte, multi-layer,** sputter-deposited medium-temp. **solid oxide fuel cells** with)

AB The deposition, interfacial impedance, and characteristics of **solid oxide fuel cells** (SOFC) with thin-film **multi-layer electrolytes** are described. Layers of 1 .mu.m thick Ag-YSZ (Y2O3-stabilized ZrO2) cermet cathode, 15-20 .mu.m thick electrolyte, and a 1-2.5 .mu.m thick Ni-YSZ anode were deposited on porous Al2O3 by reactive magnetron co-sputtering of metal targets in Ar-O mixts. The effect of adding Y-stabilized Bi2O3 (YSB) and Y-doped CeO2 (YDC) layers at the YSZ electrolyte surfaces was investigated. The open circuit voltage of the H/H2O (3%), Ni-YSZ/electrolyte/Ag-YSZ, air **fuel cells** tested at 750.degree. was 0.78-0.85 V, less than expected theor., indicating some porosity in the electrolyte layers. The cell resistance was 4.5 .OMEGA.-cm2 for a YSZ electrolyte, due mainly to the electrode interfacial resistance, and the max. power d. was 35 mW/cm2. Adding a 60 nm-thick YSB layer at the YSZ/Ag-YSZ interface reduced the air electrode resistance from .apprxeq.1.4 to 0.45 .OMEGA.-cm2, leading to an increase in the max. power d. to .apprxeq.50 mW/cm2. Adding a 100 nm-thick YDC layer at the

Ni-YSZ/YSZ interface further increased the max. power d. to 110 mW/cm2 at a cell resistance of 1.6 .OMEGA. cm2. The three-layer YSB/YSZ/YDC electrolyte thus resulted in a factor-of-three increase in power d. over a YSZ electrolyte.

L5 ANSWER 19 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1993:452813 CAPLUS
DOCUMENT NUMBER: 119:52813
TITLE: Development of cofired type planar SOFC
AUTHOR(S): Takagi, Hiroshi; Taira, Hiroaki; Shiratori, Akira; Kobayashi, Shozo; Sugimoto, Yasutaka; Sakamoto, Sadaaki; Tomono, Kunisaburo
CORPORATE SOURCE: Ceramic Res. Dev. Dep., Murata Manuf. Co., Ltd., Nagaokakyo, 617, Japan
SOURCE: Proceedings - Electrochemical Society (1993), 93-4(Proceedings of the Third International Symposium on Solid Oxide Fuel Cells, 1993), 738-43
CODEN: PESODO; ISSN: 0161-6374
DOCUMENT TYPE: Journal
LANGUAGE: English

TI Development of cofired type planar SOFC
IT Firing, heat-treating process
(co-, of multilayer ceramic-cermet-alloy **fuel-cell** structure)
IT Sintering
(of multilayer ceramic-cermet-alloy **fuel-cell** structure)
IT Coating process
(blade, of lanthanum strontium manganese oxide and yttria-stabilized zirconia multilayers, for co-firing of **fuel-cell** structure)
IT **Fuel cells**
(solid-state, manuf. of, by co-firing of component multilayers)
IT 143107-06-6
RL: USES (Uses)
(anodes, in co-fired multilayer **solid-oxide fuel cells**)
IT 126447-16-3, Lanthanum strontium manganese oxide (LaSrMnO3)
RL: USES (Uses)
(cathodes, in co-fired multilayer **solid-oxide fuel cells**)
IT 64417-98-7, Yttrium zirconium oxide
RL: USES (Uses)
(**electrolyte**, in co-fired **multilayer solid-oxide fuel cells**)
IT 11105-45-6
RL: USES (Uses)
(interconnects, in co-fired multilayer ceramic **solid-oxide fuel cells**)
IT 1314-23-4, Zirconium oxide (ZrO2), uses
RL: USES (Uses)
(yttria-stabilized, **electrolyte**, in co-fired **multilayer solid-oxide fuel cells**)
IT 1314-36-9, Yttrium oxide (Y2O3), uses
RL: USES (Uses)
(zirconia stabilized with, **electrolyte**, in co-fired **multilayer solid-oxide fuel cells**)
AB A **solid-oxide fuel cell** (SOFC) was assembled by co-firing the component layers, including the interconnects. The anode is Ni/Y2O3-stabilized ZrO2 cermet, the electrolyte is

Y2O3-stabilized ZrO2, the cathode is (LaSr)MnO3, and Ni-Cr alloy was used for interconnects. The green films were formed using the doctor blade method, the layers were combined, co-fired at .ltoreq.1400.degree., and sintered into a rigid structure. The thickness of electrodes and electrolyte is 50-100 and 150-250 .mu.m, resp. The cells were operated at 1000.degree. using H fuel and air as oxidant. The open-circuit voltage of a single cell was 1.2 V and the c.d. was 0.3 A/cm2 at 0.7 V. The max. power of a 6-cell stack with effective electrode surface area of 110 cm2 was 120 W for short-term operation.

L5 ANSWER 20 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1991:85371 CAPLUS
DOCUMENT NUMBER: 114:85371
TITLE: Manufacture of **multilayer** oxide ceramic solid **electrolyte**
INVENTOR(S): Schroeder, James E.; Anderson, Harlan U.
PATENT ASSIGNEE(S): California Institute of Technology, USA
SOURCE: U.S., 14 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 4957673	A	19900918	US 1988-151172	19880201
US 5057362	A	19911015	US 1990-553477	19900713

PRIORITY APPLN. INFO.: US 1988-151172 19880201

TI Manufacture of **multilayer** oxide ceramic solid **electrolyte**
IT Linseed oil
RL: USES (Uses)
(anticracking agent, in ceramic solid-electrolyte composite tape manuf.)
IT Electrolytic cells
(solid electrolyte composite tape for, ceramic, manuf. of multilayer)
IT Ceramic materials and wares
(solid-electrolyte composite tapes, manuf. of multilayer, for electrolytic cells and **fuel cells**)
IT Oils, glyceridic
RL: USES (Uses)
(menhaden, dispersant, in ceramic solid-electrolyte composite tape manuf.)
IT **Fuel cells**
(solid-electrolyte, ceramic composites for, manuf. of multilayer)
IT 9003-49-0, Poly(butyl acrylate)
RL: USES (Uses)
(binder, in ceramic electrolyte manuf.)
IT 64417-98-7P, Yttrium zirconium oxide
RL: PREP (Preparation)
(ceramics electrolytes contg.layers of, manuf. of, for electrolytic cells and **fuel cells**)
IT 59707-46-9, Lanthanum manganese strontium oxide 61115-22-8, Lanthanum manganese oxide
RL: USES (Uses)
(electrodes, manuf. of laminates of ceramic electrolyte and, for electrolytic cells and **fuel cells**)
IT 9002-88-4, Polyethylene
RL: MOA (Modifier or additive use); USES (Uses)
(plasticizer, in ceramic electrolyte manuf.)
IT 1314-23-4P, Zirconia, uses and miscellaneous

RL: PREP (Preparation); USES (Uses)
(yttria-stabilized, ceramic electrolyte contg. layers of, manuf. of, for electrolytic cells and **fuel cells**)

IT 1314-36-9P, Yttria, uses and miscellaneous
RL: PREP (Preparation); USES (Uses)
(zirconia stabilized by, ceramic electrolyte contg. layers of, manuf. of, for electrolytic cells and **fuel cells**)

AB Solid electrolytes comprising a layer of fine stabilized ZrO2 particle on an agglomerated La manganite layer are prepd. by: heating La manganite powder at predetd. temp. to form agglomerated powder; lightly crushing the agglomerated powder; mixing the crushed agglomerate with a binder-plasticizer and a solvent to form a 1st slurry without breaking the sized agglomerate; forming the slurry into a 1st tape; evapg. the solvent; allowing the binder to cure; prepg. a mixt. of fine stabilized ZrO2 powder, dispersing agent, a solvent, and an anticracking agent; forming a layer of the mixt. on the 1st tape, removing the 2nd solvent, and sintering at 1300.degree.. The electrolyte have no significant migration of Mn from the 1st tape to the 2nd tape. The electrolyte is useful in **high-temp**. solid-electrolyte **fuel cells** and **high-temp**. solid-electrolyte electrolytic cells.

L5 ANSWER 21 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1990:238178 CAPLUS
DOCUMENT NUMBER: 112:238178
TITLE: Electrochemical generator apparatus containing modified **high temperature** insulation and coated surfaces for use with hydrocarbon fuels
INVENTOR(S): Singh, Prabhakar; Ruka, Roswell J.; George, Raymond A.
PATENT ASSIGNEE(S): Westinghouse Electric Corp., USA
SOURCE: U.S., 9 pp.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 4898792	A	19900206	US 1988-280915	19881207
EP 376436	A1	19900704	EP 1989-307859	19890802
EP 376436	B1	19931027		
R: BE, CH, DE, ES, FR, GB, IT, LI, SE				
ES 2045447	T3	19940116	ES 1989-307859	19890802
NO 8903216	A	19900608	NO 1989-3216	19890810
NO 175278	B	19940613		
NO 175278	C	19940921		
KR 9711197	B1	19970708	KR 1989-14801	19891014

PRIORITY APPLN. INFO.: US 1988-280915 A 19881207

TI Electrochemical generator apparatus containing modified **high temperature** insulation and coated surfaces for use with hydrocarbon fuels

IT **Fuel cells**
(hydrocarbon-air, carbon deposition prevention in, oxide-coated insulation materials for)

IT 1304-28-5, Barium oxide, uses and miscellaneous 1305-78-8, Calcium oxide, uses and miscellaneous 1306-38-3, Cerium oxide, uses and miscellaneous 1309-48-4, Magnesium oxide, uses and miscellaneous 1314-11-0, Strontium oxide, uses and miscellaneous 1344-28-1, Aluminum oxide, uses and miscellaneous 11099-02-8, Nickel oxide
RL: USES (Uses)

(insulation materials coated with, for prevention of carbon deposition in hydrocarbon-air **fuel cells**)

IT 7440-44-0, Carbon, uses and miscellaneous
RL: USES (Uses)
(prevention of deposition of, in hydocarbon-air **fuel cells**, insulation materials for oxide-coated)

AB The app. comprises a hydrocarbon-air **fuel-cell** assembly operating at >700.degree. and contg. a **plurality** of solid-**electrolyte** **fuel-cell** bundles and insulation materials in the form of .gtoreq.1 porous partition boards between cell bundles, porous app. insulation, porous cell support boards, porous fuel entry distribution boards, and porous fuel condition boards, where the hydrocarbons-contg. gaseous fuel contacts the insulation materials. At least 1 of the insulation materials is impregnated with a material contg. metal M selected from Mg, Ca-Al, Sr-Al, Ce, and/or Ba and M + Ni. M is esp. Mg and/or Ce. The M-contg. material is M salt selected from nitrate, formate, and acetate. After impregnation of the insulating material and prior to assembly into the **fuel-cell** assembly the impregnated insulation material is heated in air to oxidize the M-contg. material. The M oxides formed are effective in preventing the deterioration of the **fuel-cell** assembly due to C deposition from the hydrocarbon fuel and any Ni formed is effective as a fuel-reforming medium.

L5 ANSWER 22 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1987:7553 CAPLUS
DOCUMENT NUMBER: 106:7553
TITLE: Electrochemical generators
INVENTOR(S): Makiel, Joseph Marion
PATENT ASSIGNEE(S): Westinghouse Electric Corp., USA
SOURCE: Eur. Pat. Appl., 29 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 191229	A1	19860820	EP 1985-308496	19851121
EP 191229	B1	19900307		
R: BE, DE, FR, GB, IT, SE				
US 4640875	A	19870203	US 1985-699118	19850207
CA 1257898	A1	19890725	CA 1985-496307	19851127
JP 61183878	A2	19860816	JP 1986-10944	19860120

PRIORITY APPLN. INFO.: US 1985-699118 19850207

TI Electrochemical generators

IT **Fuel cells**
(generators, gas-confinement scheme for solid-electrolyte)

AB A **high-temp.** solid-electrolyte **fuel-cell** generator comprises: a gas-permeable thermal-insulation layer of Al2O3 fibers placed next to and in an exterior housing; an interior vol. defined by the thermal insulation, with a gas-permeable partition dividing this vol. into .gtoreq.2 chambers, 1 of the chambers being a generating chamber; a **plurality** of solid-**electrolyte** elongated **fuel cells** in the generating chamber; and means for supplying fuel and oxidant gas to the cells for reaction in the generator chamber so that reacted fuel gas passes through the gas-permeable partition. A metal-sheet seal means is disposed through the thermal insulation and extends from the exterior housing to the gas-permeable partition so that reacted fuel gas cannot pass from the generating into another chamber through the thermal insulation, but must

pass through the gas-permeable partition into the other chamber. Convenient versions of the **fuel-cell** generator are described and illustrated.

L5 ANSWER 23 OF 23 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1967:460369 CAPLUS
DOCUMENT NUMBER: 67:60369
TITLE: Aggregate of galvanic **fuel cells**
PATENT ASSIGNEE(S): Battelle-Institute e. V.
SOURCE: Neth. Appl., 13 pp.
CODEN: NAXXAN
DOCUMENT TYPE: Patent
LANGUAGE: Dutch
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION: = GB 1143116

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
NL 6613641		19670410		
PRIORITY APPLN. INFO.:			DE	19651008

TI Aggregate of galvanic **fuel cells**
IT **Fuel cells**
(**high-temp.**, with yttrium oxide (Y2O3)-zirconium oxide (ZrO2) electrolyte)
IT 1314-36-9
RL: PRP (Properties)
(**fuel-cell** electrolytes form zirconium oxide (ZrO2) and)
IT 1314-23-4, uses and miscellaneous
RL: USES (Uses)
(**fuel-cell** electrolytes from yttrium oxide (Y2O3) and)
AB A mech. very stable cell construction to be used for gaseous fuels and a gaseous oxidizing agent at **high temps.** is described, consisting of disk-shaped electrolytes with thin-layered, gas-permeable electrodes at both sides. The solid electrolyte layers are located on the top of and at a small distance from each other and are connected with supports of the same material. The thin electrolyte layers are sintered together so that gas-tight chambers are formed, which are provided with fuel gas and oxidizing agent through bores which are directed perpendicularly to the electrolyte layers. The fuel gas or the oxidizing gas flows through the chambers, while the other gas surrounds the chambers. The anode and cathode spaces are open in the same direction, and the fuel gas and oxidizing gas flow from the inside through the **multilayered electrolytes** to the outside. A no. of smooth electrode-contg. **multilayered electrolytes** can be connected in series by pressing. A battery of cell aggregates was made with a capacity of 3 kw./l. aggregate at 900.degree.. The electrolyte used was a mixt. of ZrO2 92 and Y2O3 8 mole %. The electrolyte layers were 0.25-0.30 mm. thick, the electrode spaces were 0.2-0.25 mm., H was used as fuel gas and air as the oxidizing gas, and the c.d. was 0.5 amp./cm.2 at 0.7 v.

09/897116

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	ErrorDefinition	Errors
					USPAT; US-PGPUB; EPO; JPO; DERWENT				
1	BRS	L3	387	(HARA near3 NAOKI).in.		2003/08/08 18:29			0
2	BRS	L4	106	(MUNAKATA near3 FUMIO).in.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/08/08 18:36			0
3	BRS	L5	123	(IWASAKI near3 YASUKAZU).in.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/08/08 18:37			0
4	BRS	L6	606	3 4 5.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/08/08 18:37			0
5	BRS	L7	106	6 and (fuel! adj cell)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/08/08 18:38			0

	Type	L #	Hits	Search Text	DBs	Time Stamp	Comments	ErrorDefinition	Errors
6	BRS	L8	31	7 and (((solid adj oxide) (high adj3 temperature)) with (fuel! adj cell))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2003/08/08 18:38			0

(FILE 'HOME' ENTERED AT 16:29:25 ON 08 AUG 2003)

FILE 'CAPLUS' ENTERED AT 16:29:40 ON 08 AUG 2003

L1	428	S	(PLURAL OR PLURALITY OR MULTI-LAYER? OR MULTILAYER? OR MULTIP
L2	95	S	L1 AND (FUEL CELL)
L3	6	S	L2 AND (HIGH TEMPERATURE)
L4	17	S	L2 AND (SOLID OXIDE)
L5	23	S	L3 OR L4
L6	3926	S	(FUEL CELL) AND (SOLID OXIDE)
L7	2	S	L6 AND (SECOND ELECTROLYTE)
L8	2	S	L7 NOT L5
L9	8	S	L6 AND (SECOND (2A) ELECTROLYTE)
L10	8	S	L9 NOT L5
L11	8	S	L10 OR L8